Past, Present and Future of Broadband Investment – Title II and Voodoo Economics

1. Summary

THE Context, THE "Claims", and THE Evidence

A concerted, well financed lobbying campaign of growing intensity is underway, claiming that Title II reclassification of broadband as included in the FCC's Open Internet Order of Q1 2015 will inevitably cause, and indeed has already resulted in a significant decrease in the level of broadband investment in the US

Economists with impressive credentials have presented evidence and analyses supporting these claims, in particular Dr. Hal Singer with regard to investment in the months since the Order was promulgated[1], and Drs. Kevin Hassett and Robert Shapiro in an analysis of historical data on investment levels from which they have concluded that investment in broadband infrastructure will fall substantially (by up to 30% or more) unless Title II reclassification is reversed[2]. Their findings have been endorsed and repeated in various forums by the industry group the US Telecom Association[3] and by Federal Communications Commission (FCC) Commissioner Ajit Pai[4].

This research document clearly demonstrates that, notwithstanding the extensive resumes and experience of these economists, they have made elementary errors in their use of evidence and application of analytical tools to arrive at their findings. They make highly selective and misleading use of data, while the results of the Hassett/Shapiro study fall into the trap (an unfortunately common abuse of statistics) of attributing causation directly to correlation with no explanation or identification of a causal mechanism. Yet there are many statistically significant correlations between events that are not causally linked in any way.

The findings of these economists are unsupported and illegitimate. They have no place or probative value in deliberations about the merits and faults of Title II regulation. This document does not take the contrary position to these economists,

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[1] Dr. Hal Singer, http://www.forbes.com/sites/halsinger/2015/08/25/does-the-tumble-in-broadband-investment-spell-doom-for-the-fccs-open-internet-order/ (Singer)

[2] Drs. Kevin Hassett and Robert Shapiro, http://www.sonecon.com/docs/studies/Impact_of_Title_II_Reg_on_Investment-Hassett-Shapiro-Nov-14-2014.pdf (Hassett/Shapiro)

[3] http://www.ustelecom.org/blog/title-ii%E2%80%99s-long-term-impact-harmful-hassett-shapiro-study-shows ; http://www.ustelecom.org/news/filings/ustelecom-letter-fcc-title-ii-investment-impact-study

[4] https://www.fcc.gov/document/comm-pai-remarks-declining-broadband-investment-0

namely that Title II will result in an increase in investment. The point is not that there is substantial evidence in favor of this latter hypothesis but rather that there is no evidence in favor of the economists' findings.

There are many factors and forces both endogenous and exogenous that affect the ability and the propensity of an individual operator and of operators collectively to invest in new and upgraded networks over time. Multiple examples of these factors and the substantive roles they play are presented below. But the economists and those who are trumpeting their findings as proof of a conclusion they perceive to be supportive of the positions they are advocating in debates about public policy and regulation are focused on just one of these factors, namely a regulatory policy to which they ascribe a decisive influence greater than any other.

Moreover, their focus on this policy, Title II, only looks at its potential impact on an input, investment, and pays no attention to the outputs of investment. The implication of their insistence upon the portrayal of Title II as inimical to investment is that they regard the level of investment, and the importance of increasing, and perhaps even maximizing this input as a goal in itself, and its value as a key criterion against which to judge the merits of a policy or regulation. But their approach of concentrating on inputs without any consideration of outputs (or productivity defined as the output produced per unit of input) reflects a strange school of economic thought. This school can be characterized as input-obsessed but output-indifferent as well as evidence-insensitive (or more harshly fact-denying). Yet the role of improvements in productivity, both quantitatively and qualitatively, is central to the claim that capitalism has been and will continue to be the economic system best capable of lifting up the living standards of the greatest number of people.

This document includes examples in which a desirable outcome is a reduction and not necessarily an increase in or maintenance of the level of investment or input to one sector of the economy. Reduction in the investment required to achieve a targeted level of output in one sector (in this case the coverage, capacity, quality and affordability of broadband services) may free additional resources to be invested productively elsewhere.

The weight of the contradictory evidence to their findings outlined in this document and the demonstration of the logical flaws in their work raise the question of how or why these experienced economists could be making such elemental errors in their work on Title II and investment. It is impossible to know exactly what they were thinking in reaching their conclusions, or to divine their motivations. One plausible but not flattering hypothesis is they are simply making mistakes as anyone sometimes can, even the most experienced experts in a professional domain. Other hypotheses are that:

(i) Their commitment to the desirability of an outcome justified by the finding of a negative link between Title II and investment – the minimization or even emasculation of regulatory authority over broadband operators that is based on their belief in an extreme "free market" ideology according to which a regulator is only a source of problems and not solutions - overrides any pressure or professional discipline to undertake an independent, objective analysis, or

(ii) Like lawyers these economists feel an obligation to use whatever arguments are at hand and any fragmentary evidence that can be presented, no matter how weak or flawed and vulnerable to a body of conflicting verifiable facts, to defend and advance the expressed interests of clients who fund them. In this last scenario the imperative of seeking the truth, no matter how inconvenient or unexpected, is subordinated to the imperative to satisfy a paymaster.

The Findings

The conclusions of this document are:

1. **The claims and assertions by the major broadband operators and the economists who produce reports, notably Drs. Hal Singer, Kevin Hassett and Robert Shapiro that support their position about the negative impact of Title II on broadband investment are unfounded.**
   There is significant evidence that conflicts with their findings. Moreover their findings are based on logically or methodologically flawed analyses. The economists also fail lamentably to take into account a comprehensive or realistic or even adequate set of drivers of or influences on investment decisions and the ways in which investments are rolled out over time, of which regulation is only one factor among many others. These drivers involve factors that are both exogenous and endogenous to the network sector collectively and to individual operators. Regrettably the findings of these economists have been eagerly endorsed (and at least partly funded) by the largest US broadband operators and reiterated by others as "proof" of the harm attributable to Title II. Their endorsements of these unsupported claims are part of the major US broadband operators' well-financed

campaigns and lobbying against the Open Internet Order in order to achieve their goal of an effectively toothless regulatory environment for their businesses.

2. **Furthermore, contrary to the implication of the headlines alleging that one impact of Title II will be to cause reductions in investment – that more investment is "good" and less investment is "bad" – reductions in investment can be a desirable outcome**.
   Beneficial reductions in investment requirements can be the result of being able to achieve more "bang for the buck" thanks to advances in technology and engineering techniques and/or of the consequences of certain regulatory policies that enable targets of broadband performance and coverage at affordable costs (or prices) to be achieved with lower investments than might otherwise be possible.

3. **The pattern of and fluctuations in broadband investment in recent years including during 2015 can most reasonably be attributed, as confirmed by statements by operators themselves, to the timing of the implementation and fulfillment of multi-year programs of network upgrades and the deployment of new technologies**.
   These technologies include notably LTE in wireless and various fiber and increasingly fiber-intensive systems in wireline. The levels of investment are driven by the operators' own business decisions within the constraints of the financial resources available to them. There is no credible evidence that the prospect of Title II regulation has had or is having any significant impact on these decisions.

4. **Cable operators are the largest broadband providers in the US market, including the individual market leader, that collectively account for a majority market share (a share which is larger at the higher than the lower speeds), so their perceptions of the broadband market and its attractiveness carry great weight[5].**
   Hence two significant signs that Title II is not making and will not make broadband a less attractive market for operators with a depressing effect on broadband investment are the:

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[5] The cable sector now has more broadband than video subscribers and they enjoy higher margins on their broadband services, see for example respectively: http://www.nytimes.com/2015/05/05/business/media/comcasts-earnings-rise-10-driven-by-high-speed-internet.html?_r=0 and https://gigaom.com/2014/02/12/comcast-and-time-warner-cable-forget-tv-it-is-all-about-broadband/

(i) Significantly higher valuation of Time Warner Cable in Charter Communications' acquisition bid *after* promulgation of the Open Internet Order in February 2015 compared to the earlier now abandoned bid by Comcast in 2014 *prior* to this Order, and

(ii) Forecasts of the cable sector in 2015 including estimates and projections for the period 2009-2019 published in early October 2015 by a major respected source of information on this sector that indicate no negative influence on or correlation of Title II with investments[6].

5. **One of the fiercest and most persistent opponents of Title II – Verizon – that is promulgating the claim of a harmful negative impact of Title II on investment has been able to reduce the investments it has had to make in its fiber broadband FiOS infrastructure and to increase its revenues to support these investments *as a direct result of the benefits available to it under Title II.***
Verizon argues vigorously that Title II is somehow intrinsically "bad" although it has led to a "good" outcome for its business (reducing its investment requirements and burdens to the benefit of its cash flow), but cannot produce this outcome for anyone else. Title II- related reductions in investment are apparently good for Verizon, but inconsistently, or more harshly expressed hypocritically, Verizon also takes the position that reductions in investments must be bad for everyone else and the public interest.

6. **Despite foreboding statements to the contrary there is no evidence from two other leading broadband operators, Comcast and AT&T, that Title II is having any material, let alone a negative, influence over their investment propensities.**
AT&T announced the ramping down of its investments in both fixed (Project VIP) and mobile (LTE) broadband as major investment programs approached completion on several occasions well before the promulgation of the Open Internet Order. Comcast is continuing its investments at the same or higher level as in the years preceding this Order, during which Title II-free period it could have invested more but chose not to, even to improve its well documented and highly unsatisfactory record of customer service and care.

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[6] SNL Kagan, "US cable CapEx on track to reach new heights in 2015," (subscription service) https://www.snl.com/InteractiveX/ArticleAbstract.aspx?id=34058560 – this forecast is reproduced in Table A3 in Appendix A.

7. **Several telephone companies including AT&T are accepting Connect America Fund (CAF-II) funding from the FCC to deploy broadband to rural and allegedly otherwise uneconomic locations including associated regulatory obligations.**
   Title II is not acting as a deterrent to expanding broadband services into hitherto un- and underserved areas given the evident commitment of the FCC to doing all within its power, including but not limited to assistance to private sector operators, to maximize the coverage and capacity of affordable broadband services throughout the US.

8. **Broadband operators and their supporters repeatedly claim falsely that they are facing strong and dynamic competition hence Title II is unnecessary and imposes an unjustified burden on the market.**
   However these operators are substantially protected from competition, especially in the provision of fixed broadband services, by franchises that award them privileged rights, such as access to rights-of-way and other scarce resources and authorizations to deliver telecommunications and other services to customers. Weak competition in the provision of broadband services to locations throughout the US invalidates these operators' argument that market forces or the "invisible hand" can take the place of regulation, including through the provisions of Title II, to ensure that they do not behave anti-competitively or in ways that harm the public interest and customers when they perceive powerful financial incentives to do so.

9. **The focus on data about broadband investments reported during the first half of 2015 as evidence of the negative impact of the FCC's Open Internet Order on these investments is unjustified and proves nothing about the impact of Title II.**
   The finding by Dr. Singer that the promulgation of the FCC's Open Internet Order at the end of February 2015 was the direct cause of a reduction in broadband investment during the second quarter of 2015 below what it would otherwise have been suggests a surprising ignorance or neglect on his part of the multiple, interacting factors and forces that affect the level of this investment at any point in time, and of the leads and lags that are inherent in multi-year investment programs. This finding is fabricated out of whole cloth purely as a scaremongering tactic to help broadband operators advocate for and achieve their goal of an effectively regulation-free environment (depicted euphemistically as "light" regulation) for their operations. It is designed to deceive. It is neither a credible nor a useful contribution to debates about issues in public policy and regulation for the economically and

socially vital infrastructure of broadband and the market for broadband access services on which all residents and organizations (public and private) increasingly depend individually and collectively to fulfill their aspirations or missions and achieve their goals.

10. **The issue of the impact of Title II regulation, and of regulation in general, on the future of broadband in the US deserves an honest, objective, fact-based, logically robust and transparent analysis that does its best to address a complex economic problem with many variables and significant leads and lags in their consequences.** Unfortunately the findings and narrowly focused and/or short-term analyses presented by Drs. Singer, Hassett and Shapiro, fail to meet the minimum bar of evidence-based credibility and analytical integrity and robustness, even though Dr. Singer himself has acknowledged the complexity of the problem.

2. Network Investment – The Evidence and the Drivers

2.1 History and Trends

The propensity and ability of network operators to invest in network infrastructure, individually and collectively, are influenced by factors (some operator-specific and others that are more widely relevant to the entire sector) that affect their costs of and accessibility to capital, and their expectations of revenues and profits or returns on investment. The claims and assertions of Hassett/Shapiro and Singer, echoed by FCC Commissioner Pai, about the negative impact of Title II on investment are based on analyses and discussions whose findings are the result of the:

(i) Abuse of statistics in ascribing causation to correlation;
(ii) Selective and hence deceptive use of evidence to establish correlations;
(iii) Neglect of factors other than the presence or absence of Title II on operators' investment decisions and propensity; and
(iv) Failure or a blind eye to the exploitation of Title II benefits in major telephone franchise areas to help fund the deployment of new fiber broadband networks.

Moreover the economists just cited are using the level of broadband investment as a direct measure of "goodness" of what operators are doing, which is not however, or at least not always or necessarily the goal (maximize investment) of a specific public policy. Consider for example, even though civil works that comprise a substantial proportion of total investments in networks are not subject to the marvelous Moore's Law of rapid and sustained improvements in performance/price as semiconductors, the potential impact of material progress in reducing the costs to install new and upgrade existing networks per customer and/or location served. The sources of these improvements could include for example (not an exhaustive list):

- Greater efficiency and improved techniques in laying new cable;
- Expanded reuse and sharing of existing infrastructure (ducts, towers);
- Reduced space and power requirements and lower prices for the most modern equipment;
- Inherently lower costs of new network architectures etc.

In a plausible optimistic scenario the investments required to achieve desirable goals of incremental network coverage and capacity will be falling over time independently of any decision about the regulatory classification of the services delivered over this infrastructure.

Economists who analyze and make recommendations on many issues in telecommunications, including the desirable scope and extent of regulatory authority and action typically refer to the dynamism of technology as justification for a “hands off” approach to regulation in order not to unwisely or inadvertently stifle innovation by the premature imposition of rules that are rapidly rendered irrelevant at best or harmful and restrictive at worst by unanticipated developments. Yet these same economists in tackling the question of a relationship between Title II and investment make reference to their versions of historical patterns of investment in networks, that involved technologies that are very different from today's, to argue that it is Title II which must be driving any changes in investment levels that they claim (whether true or false) to be observing.

Conveniently for the purposes of the large broadband operators that wish to minimize or eliminate any effective rules or external authority over their behavior, technological dynamism is the basis of their argument against significant regulation that may stifle innovation that is in the public interest. But inconsistently this same dynamism and innovation are not invoked as capable of influencing (reducing) the level of broadband investments required to achieve targets of expanded broadband coverage and capacity, which is also in the public interest.

In other words the argument that the total amount of capital invested by a single firm (or an entire industry sector) is or should be a key criterion or measure for deciding whether the impact of a policy or regulatory initiative is or will be beneficial is not always valid. It should be challenged and examined in the context of individual circumstances Suppose for example that the policy stimulates innovation by new players that reduces the costs of achieving targets for this sector thereby improving its productivity (output per $ of investment) and hence the amount that has to be and indeed is invested. Should not this outcome be regarded as beneficial from an overall economic or welfare perspective? Is that not how living standards have been increased?

More broadly there are several outcomes that may justifiably be regarded as the fruits of a successful policy or regulation. A policy or regulation may be regarded as successful if it enables the generation of greater value than might otherwise be possible for a given level of investment, or if it increases the demand for the services and products built on this investment thereby encouraging increases in investment to meet this higher demand. Demand may grow if there is some price elasticity and prices can be lowered thanks to reduced costs to deliver these services and products.

This kind of objective, open minded-thinking and analysis of all the possibilities is beyond the scope of what Drs. Singer, Hassett, and Shapiro have been considering and Commissioner Pai has been reiterating. In contrast they offer a blinkered interpretation of the causes of fluctuations in investment levels, whether real or fabricated, by the use of carefully selected data, that they intrinsically attribute to the presence or absence of Title II regulation. Their findings and assertions defy common sense and evidence. They reflect either ignorance of the structure of and influences on network investments and the investment decisions of network operators, and/or an unwillingness to acknowledge facts that do not support their hypothesis (also known as inconvenient truths).

2.1.1 An Inconvenient Inconsistency – Less Investment is "bad" except when it is "good"

Insufficient attention has been paid to the evident inconsistencies or incompatibilities across the positions taken and advocated by major US broadband operators with respect to the various policy and regulatory issues that they address. An example relevant to the issue of the impact of Title II on investment is the position taken by AT&T and Verizon on the question of reserve spectrum in the upcoming 600 MHz incentive auctions. They and their supporters have argued that establishing a spectrum cap on operators for their sub 1GHz spectrum holdings in license areas that would have the effect of barring them from bidding on up to 30

MHz of 600 MHz spectrum in many areas (as adopted by the FCC in its rules) is a bad idea because their exclusion will depress the total revenues generated by these auctions[7].

This argument is based on the desirability of maximizing the one-time revenues generated by a spectrum auction that allegedly will not be met if there are any spectrum set asides that exclude the two largest US mobile operators from bidding on their licenses. However while obtaining a reasonable price or return for the public from allocating rights to use a scarce public resource (spectrum) is a legitimate objective, the goal of maximizing this return at any cost or harm to other goals is not. The greater the amounts operators have to spend to acquire spectrum licenses the fewer financial resources they will have to invest to deploy networks in the frequencies acquired. Hence if auction revenues i.e. spectrum prices rise too high these deployments may be curtailed or delayed, which will depress both the direct economic benefits generated by the construction of networks as well as the indirect economic benefits resulting from usage of the applications and services these networks will support. The indirect benefits of wireless networks may well be the greatest contributors to increased total welfare[8].

So there is a possibility that maximization of auction revenues, while making the short-term greatest contribution to the revenues of the public Treasury will depress investment in wireless networks, exactly the outcome that the two largest US mobile broadband operators are warning against as an alleged outcome of Title II. Furthermore the goal of maximizing auction revenues as the highest priority will in this scenario reduce the benefits that deployment of networks in the spectrum acquired will deliver, by decreasing the net present value of the revenues the Treasury will receive directly from mobile construction activities and the mobile services they carry, and indirectly from the economic activities they stimulate.

A possible counterargument from AT&T and Verizon is that they are the most efficient users of spectrum and hence enabling them to maximize the spectrum resources that they acquire (i.e. no bidding restrictions) will ensure that the greatest possible value is generated by exploitation of this spectrum. However the metric they (and the industry association of which they are the two largest members, the CTIA) apply to measure spectrum efficiency and show that AT&T and

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[7] See for example, http://www.sonecon.com/docs/studies/EconImplicationsSpectrumAuctions.pdf (Shapiro/Holtz-Eakin/Bazelon) and http://www.attpublicpolicy.com/uncategorized/atts-testimony-on-the-hill-to-the-spectrum-incentive-auction/

[8] See for example http://www.gsmamobileeconomy.com/GSMA_Global_Mobile_Economy_Report_2015.pdf

Verizon are superior in this respect to other operators (not only in the US but worldwide) is spurious and does not in fact measure the efficiency of spectrum use in a cellular network.

The spurious character of this metric has been demonstrated conclusively more than once and in several forums[9] and has also been communicated to economists who use it[10]. But both they and the broadband operators have ignored the evidence presented to them and have continued to update the metric regardless. **The repeated application of a spurious spectral efficiency metric is a striking example of the disturbing tendency of the largest US broadband operators to offer fact-denying, logic-defying analyses and claims in their lobbying and advocacy about public policy and regulatory issues that affect their businesses.**

2.1.2 The flawed foundations of economists' pessimistic analyses of the impact of Title II on investment

The Hassett/Shapiro finding[11] on the impact of Title II on investment has been rebutted and the analysis from which it is derived has been shown to be logically or methodologically flawed.[12] No response has been received despite attempts to contact these authors to discuss this rebuttal of their work in an open and transparent debate to determine which of the two irreconcilable findings are correct, or whether there is an alternative interpretation of the investment data.

A characteristic of Hassett/Shapiro and other proponents of the theory that Title II will entail reductions in broadband investment is that they fail to consider the multiple factors and forces (endogenous and exogenous) that affect the level of investments made by individual operators and by the operator industry as a whole over time and during specific reporting periods. As Dr. Singer himself has pointed out, assessment of the impact of regulation on investment is a "complicated economic problem."[13] Yet he ignores these complexities in his analysis both in terms of total investment and in looking at the investments of individual operators. He provocatively situates the alleged impact of Title II in a rare category of harm along

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[9] Information Age Economics, http://apps.fcc.gov/ecfs/document/view?id=7021920798; Bloomberg BNA Daily Report for Executives, May 31 2013, "The Mystery of the Spurious Spectrum Efficiency Metric: Why Are America's Wireless Leaders Promoting a Meaningless Measure?"

[10] In particular, Dr. Shapiro of Shapiro/Holtz-Eakin/Bazelon, ibid.

[11] Hassett/Shapiro, ibid.

[12] MFRConsulting, Title II and Broadband Investment: Spurious Correlations,http://apps.fcc.gov/ecfs/document/view?id=60001044394

[13] Comment by Dr. Singer in response to others' comments at Singer, ibid.

with the adverse consequences of the collapse of the dotcom bubble in 2000 and the Great Recession of 2008 for broadband investment.

Among these multiple factors and forces that affect investment levels are (not necessarily an exhaustive list or in any order of importance):

- The timing and completion of major network upgrade programs
- The timing of major deployments of new technologies with improved price/performance
- Vendor discounts (typically greatest for the largest operators)
- Timing of acquisitions and divestitures of network facilities and businesses
- Infrastructure sharing arrangements and other forms of cooperation that may reduce total investment requirements
- Lags and hysteresis in the actual disbursement of investment funds allocated to long term programs
- Interest rates and the average cost of capital
- Natural disasters (e.g. extreme weather conditions) that may necessitate unanticipated investments or delay planned investments
- Demand growth (e.g. the surge in the demand for wireless data following the introduction of the iPhone in 2007 and the lure of many innovative broadband-dependent applications introduced by over-the-top players) and perceptions of future demand that affect the perceived need for investment over time
- General economic conditions
- Competitive intensity of markets e.g. whether operators are aggressively competing with each other or are operating without the absence of effective competition, as in areas where there are monopolies in the supply of broadband services with speeds of 20-25 Mbps or above so that the pressure or incentive to invest further in upgrading services is limited or feeble
- Taxes whether general or telecommunications-specific (including fees as well as taxes) that influence levels of disposable income

These factors are not independent from each other in their effects but interact, for example changes in tax rates may decrease the affordability of services and hence depress consumers' demand for them. An exhaustive review of all these factors and evaluation of the weights they have in influencing investment decisions is beyond the scope of analyses presented in this document. Nevertheless the effects of several of the Title II-independent factors just enumerated are evident in the data on the levels and patterns of investment by US broadband operators in recent years, as well as currently, and in their statements about future investment plans that are discussed in more detail below. It should also be kept in mind in considering future desirable levels of broadband investment that the network industry is actively developing new system architectures such as cloud-based infrastructure and software-defined networks that may foster significant reductions in investment requirements per unit of additional performance. It is not clear at this stage what the net outcome for investments will be, or the balance between potential increases to provide more network capacity and potential decreases with the introduction of new more agile and efficient technologies, i.e. whether as a result total investment levels in network infrastructure will rise or fall independently of any influences from regulatory policy. On the wireless side another obvious deriver of investment levels is the timing of the release and award of additional spectrum as well as the conditions applied to the licenses that are acquired.[14]

2.2 AT&T

AT&T is a striking example of the influence of non-Title II factors on changes in its investment levels over time (see Table A1 in Appendix A). AT&T itself has given indications at several points in time about its ongoing and future investment intentions that have nothing to do with Title II. It has projected lower rates of investment as major programs in both the wireline (U-verse) and wireless segments (LTE) approach completion[15].

It has been hinted by Dr. Singer that another factor that may depress AT&T's investment in the US is its decision to invest $3 billion in Mexico, with the implication that this decision has been taken because the US is less attractive as a consequence of Title II. However as explained in Appendix B this hypothesis is untenable because the reasons behind AT&T's decision to enter the Mexican market that entail its need for investment "south of the border" preceded and have nothing to do with the presence or absence of Title II in the US. AT&T's investments in Mexico are the result of a reasonable and defensible business decision to exploit new opportunities that became available to AT&T following fundamental regulatory

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[14] In this regard the impact of AT&T's unilateral introduction of Band Class 17 in the Lower 700 MHz band is noteworthy (there is ample documentation in FCC Docket 12-69) for its impact in delaying the ability of small operators beyond the time they were given to achieve specified coverage levels to invest in deployment of networks in the Lower Band Block A frequencies they acquired in 2008. This is an example of an action by a major operator that was the sole cause of depressed investment by other operators for several years.

[15] http://www.rcrwireless.com/20141110/wireless/analysts-react-atts-capex-news-tag4; "Project VIP capex has peaked says AT&T," http://www.lightwaveonline.com/articles/2014/11/project-vip-capex-has-peaked-says-att.html - this article from November 2014 also refers to AT&T's statement that it has "essentially finished its 4G LTE network expansion."

reform in that country and the strong social and economic links between these two North American nations. Interestingly in Mexico AT&T has been arguing in favor of more severe regulation of the traditional incumbent quasi-monopoly operator America Movil at the same time as it advocates very loose regulation for itself in the US. While AT&T does not occupy as dominant a position in the US as America Movil has enjoyed in Mexico, nevertheless the arguments in favor of smaller competitors in Mexico (i.e. its situation in Mexico as of 2015) which it is advocating – even "...asymmetric rules are necessary"[16] – are applicable to reducing the anti-competitive obstacles AT&T itself places in the path of its smaller competitors in the US in areas such as data roaming and special access connections. But according to AT&T what is salsa for the Mexican goose is not sauce for the American gander.

2.3 Verizon

Verizon, like AT&T, illustrates the role of non-Title II factors in its decisions on and the timing of its investments in network infrastructure. Verizon exhibits the greatest gap or inconsistency (that more harshly could be characterized as hypocrisy) of any operator between its actual behavior and actions and its ardent and persistent opposition to Title II regulation. Verizon has been able to reduce the investments it has had to make in its fiber broadband FiOS infrastructure and to increase its revenues to support these investments[17] as a direct result of the benefits available to it under Title II[18]. For example Verizon states: *"Verizon NJ has been upgrading its telecommunications facilities in large portions of its telecommunications service territory so that cable television Services may be provided over these facilities. This upgrade consists of deploying fiber optic facilities directly to the subscriber premises. The construction of Verizon NJ's fiber-to-the-premises FTTP network (the FTTP network) is being performed under the authority of Title II of the Communications Act of 1934 and under the appropriate state telecommunications authority granted to Verizon NJ by the Board and under chapters 3 and 17 of the Department of Public Utilities Act of 1948. The FTTP network uses fiber optic cable and optical electronics to directly link homes to the Verizon NJ networks."*

Similar language is found in Verizon's New York City FiOS TV franchise. Indeed, the classification of FTTP as a Title II service appears to be in every Verizon FiOS TV cable franchise nationwide.

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[16] http://www.mobileworldlive.com/featured-content/top-three/att-mexico-chief-backs-dominance-regulation-report/

[17] http://www.huffingtonpost.com/bruce-kushnick/-verizon-show-us-the-mone_b_6749376.html (Kushnick); http://gizmodo.com/after-billions-in-subsidies-the-final-verizon-fios-map-1682854728

[18] http://www.verizon.com/idc/groups/public/documents/adacct/nj_swf_renewal_082013.pdf

In other words Verizon is arguing that that Title II is somehow intrinsically "bad" although it has led to a "good" outcome for its business (reducing investment requirements and burdens for the benefit of its cash flow), but cannot produce this outcome for anyone else. Title II- related reductions in investment are apparently good for Verizon, but reductions in investment and Title II regulation must be bad for everyone else and the public interest.

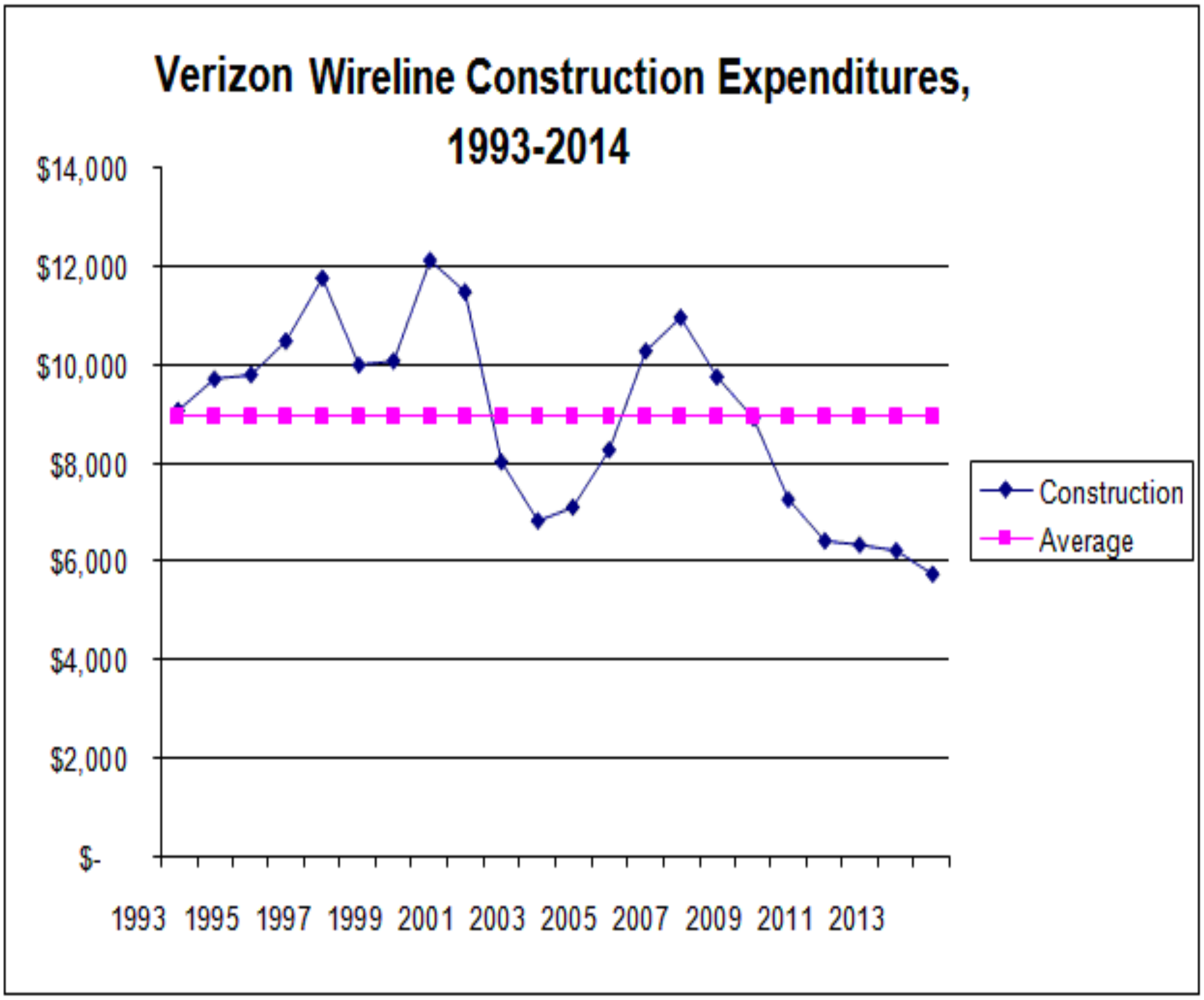
The evidence of Verizon's investments in recent years (see Appendix A, Table A1) shows a substantial decline in its fixed or wireline investments since 2007, well before the Open Internet Order. During that time Verizon has divested several telephone franchises in rural areas amount to millions of lines (including the latest sale of properties to Frontier) in order to focus its wireline properties on primarily urban and suburban areas in the Northeast and Mid-Atlantic states.

Nevertheless Verizon's reduced levels of investment, as it has completed its FiOS deployments as far as it is prepared to go to provide FiOS coverage (leaving other locations only inadequate DSL service) within its telephone franchise areas[19], still translate to significant reductions in investment per customer over the past few years and per location passed that have nothing to do with Title II – except that as noted Verizon actually benefitted from use of Title II benefits to make FiOS investments less of a burden on its financial resources. Another Title II-independent factor influencing the level of Verizon's FiOS investments has been the decrease in the costs per location passed as result of experience and improvements in technologies and engineering techniques as reported by Verizon[20].

A long-term perspective on Verizon's wireline investments is shown here that exhibits significant fluctuations both before and during the broadband era, and substantial declines since 2010, none of which can be attributed to changes in the presence or absence of Title II:

[19] "Verizon nears "the end" of FiOS builds," http://arstechnica.com/business/2015/01/verizon-nears-the-end-of-fios-builds/

[20] http://www.broadcastingcable.com/file/2396-In_a_presentation_to_analysts_and_investors.pdf



Source: Company reports including predecessor and merged companies, Bell Atlantic, NYNEX, GTE, and MCI reproduced from Kushnick, ibid.

On the wireless side Verizon has been steadily increasing its investment in wireless infrastructure that has been delivering a growing proportion of its revenues and profits thanks to growth in demand for wireless services. It is reasonable to assume that as Verizon completes LTE deployments in the spectrum licenses it currently holds that these levels of investment may then decline until and unless Verizon acquires more spectrum in which it will also deploy LTE and/or whatever more powerful technology (5G) follows LTE.

On the wireline side Verizon has been selling significant rural assets in its telephone franchises since 2007 including Northern New England (about 1.7 million telephone

lines at that time) to Fairpoint Communications and more importantly two separate larger divestitures to Frontier Communications. The first Frontier deal in 2009 involved 4.8 million access lines in Arizona, Idaho, Illinois, Indiana, Michigan, Nevada, North Carolina, Ohio, Oregon, South Carolina, Washington, West Virginia and Wisconsin, as well as some in California. The second deal announced in February 2015, and still pending as of November 2015, involves Verizon lines in California, Texas, and Florida. Verizon is also selling wireless towers to American Tower for about $5 billion.
The bulk of the assets divested to Frontier in both Verizon deals were owned by GTE, which was acquired by Verizon in 2000. The second still pending (as of October 2015) Frontier deal (at $10.5 billion) involves almost one quarter of Verizon's current access lines.

A credible interpretation of these moves by Verizon is that they have been driven by three major considerations:

- To help pay down Verizon's debt, including that which it incurred to buy out its former partner in Verizon Wireless (Vodafone UK);
- In parallel to strengthen Verizon's financial position for bidding on additional spectrum to be released and to fund further investments in its wireless business;
- To focus its wireline operations geographically, and hence with presumably or potentially greater operational efficiencies, on urban and suburban locations in the Northeast and Mid-Atlantic regions (the core revenue and profit generators for the former Bell Atlantic and NYNEX RBOCs).

Verizon's efforts to reduce its exposure to areas that are less attractive in terms of revenues from and potential returns on broadband are consistent with criticism of its failures to extend FiOS to locations within its other franchise areas that it judges to be less fruitful, despite obligations or commitments it has made to provide service. In particular Verizon's shortfalls in this regard have come under strong criticism in New York and New Jersey[21].

The size of Verizon's divestitures transactions and the substantial ongoing change in Verizon's positioning within the US market dwarf any conceivable potential significance of the presence or absence of Title II on its likely future investments.

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[21] http://www.speedmatters.org/blog/archive/elected-officials-communities-blast-verizon-for-failing-fios-buildout/;
http://www.nj.com/opinion/index.ssf/2015/08/verizon_insults_its_south_jersey_customers_editori.html

Unlike Title II a direct causal link between these initiatives of Verizon and its future interest in and scope or need for future investments is inescapable.

A discussion of Frontier Communications and its plans for broadband in the franchise areas it has and will acquire from Verizon if the second deal is approved is given later.

2.4 Comcast

The history of Comcast, like those of AT&T and Verizon, is characterized by the impact of technology developments in the pace and level of its capital investments. In contrast to the investments of the two huge telephone companies, for Comcast customer premises equipment, such as set top boxes, cable modems and routers account for a significant proportion of its capital expenditures. However, this characteristic of Comcast's investments, and indeed of the entire cable sector, is the consequence of cable operators' practice of making it difficult for customers to connect devices they acquire and pay for themselves to cable networks.

Comcast has had ample financial resources to invest in the years preceding the Open Internet Order. In fact it chose to expend a total of about $31 billion on stock repurchases and dividends (almost 70% on the former) during the period 2006-2014 inclusive, while at the same time investing a total of some $41 billion in construction and capital expenditures[22]. A reasonable question to ask is why Comcast did not invest more to improve its well documented appalling record of customer service[23] during this time, which it could have done for example by reducing its sock repurchases, that create no value for customers, by a relatively small proportion. It is reasonable to assume that Title II, which was absent, did not influence the investments Comcast made during this period. Hence it is a plausible hypothesis that the continuation of Comcast's investments at this level or higher[24] is an indication that Comcast does not perceive Title II as having any material negative effect (or perhaps any effect at all) on its propensity to invest.

2.5 Other Operators

In the overall landscape of broadband investment it is instructive and appropriate to consider and assess the implications of the plans and experiences of broadband

[22] Source for Comcast's allocation of funds: Company reports and MFRConsulting analysis
[23] http://arstechnica.com/business/2015/06/comcast-customer-satisfaction-rating-plummets-again/
[24] Table A2, Appendix A

operators that are smaller and in some cases much smaller than the largest players discussed above. Several instances are reviewed here, namely Frontier, which over the past few years has been acquiring Verizon's mainly rural telephone franchise areas, as already noted, two instances of proposed mergers and acquisitions in the cable sector, and the wireless investments of T-Mobile and Sprint.

The attitudes and plans of cable operators carry substantial weight for the future of the US fixed broadband market in which they account for over half of subscriptions and a higher proportion at higher speeds (i.e. 25 Mbps and above)[25]. Moreover now cable operators have more broadband than pay TV customers and the margins on broadband services are significantly higher. In other words US cable operators are increasingly a broadband as compared to a pay TV play.

2.5.1 Implication of the Charter/Time Warner Cable Deal

In early 2014, about a year before the FCC's Open Internet Order, Comcast proposed to acquire Time Warner Cable (TWC) in a deal (since abandoned) that valued TWC at about $45 billion[26]. In late May 2015 after the promulgation of the Open Internet Order Charter Communications announced a deal including the acquisition of TWC that valued the latter at about $55 billion[27] or 22% higher than in Comcast's earlier proposed transaction. Should it therefore be argued on the basis of this difference in valuation pre- and post- Open Internet Order that Title II has caused an increase in the value of TWC, a significant broadband operator, by 22%? Of course not, many non-Title II factors surely played a role, both Charter-specific and others. But this event is further evidence of the nonsensical character of the implications and attempts by economists such as Drs. Singer[28], Hassett and Shapiro to establish a causal link between Title II and alleged reductions in the attractiveness of the broadband sector for investors.

Notably the reported reduction of about 29% in Charter's capital investments in the first half of 2015 compared to the first half of 2014 which Dr. Singer cites along with AT&T Mobility's reduction of the same amount in percentage terms as evidence of the impact of Title II on investments might plausibly be explained (other explanations are possible) by a concern to preserve cash by all means possible in

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[25] See http://leichtmanresearch.com/press/030515release.html and http://arstechnica.com/business/2015/01/comcast-now-has-more-than-half-of-all-us-broadband-customers/

[26] http://www.wsj.com/articles/SB10001424052702303704304579379801986541412

[27] http://www.usatoday.com/story/money/2015/05/26/charter-buys-time-warner-cable-in-55b-deal/27940477/

[28] Additional examples of the perverse use of facts by Dr. Singer are provided in Appendix B

anticipation of the huge debt load (an extra $27 billion) that it will take on to consummate its acquisition, if approved, of TWC. However the idea that Charter would simultaneously reduce investment after the Open Internet Order was approved because it perceives Title II as harmful or making the broadband market less attractive, while simultaneously launching a huge bet on this market (presumably because it perceives broadband as very attractive) through an acquisition of TWC (and other assets) is only credible if it is assumed uncharitably that Charter's management has a schizophrenic mindset or is hopelessly incapable of internal communication or coordination between the major decisions that it is taking. Notably Comcast (its CEO Brian Roberts) has said that the Charter/TWC deal "makes all the sense in the world," so evidently he does not have this low opinion of Charter's management and its valuation of TWC.[29]

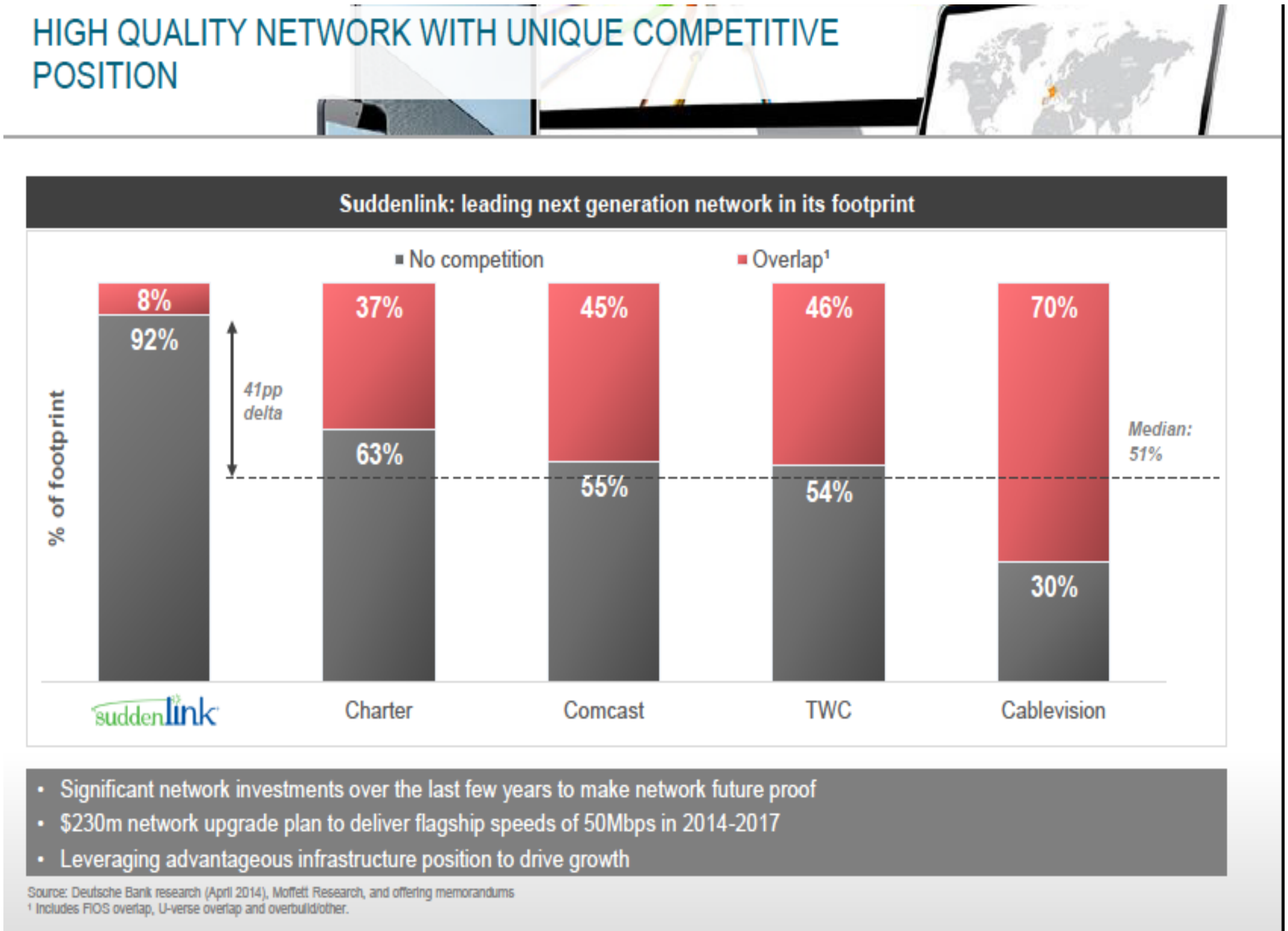
2.5.2 Perspective of a foreign investor on the US Broadband Market

A revealing insight into the status and dynamics of the US broadband market is provided by the perspective of a potential foreign investor - Altice – that has submitted applications to acquire two US cable operators, Suddenlink and Cablevision, after the promulgation of the Open Internet Order. In its presentation to investors Altice depicted the US broadband market as being attractive for its purposes *because it is uncompetitive* and hence there is plenty of scope for Altice to achieve substantial cost savings in the operations and boost the revenues of these cable operators. Whether or not these claims of future financial performance are believable – which is questionable – the data Altice presents (see the figure below) about the state of competition in the provision of broadband services at the higher speeds of 20-25 Mbps and above are worthy of serious consideration, given that the rising demand for video- and other bandwidth-intensive services are rapidly making these speeds a requirement for adequate performance, and not a luxury or premium offering.

Altice's perspective is noteworthy since it is the outcome of an analysis that is comparing the US to broadband markets in other countries where it operates. It exposes the false claim by US broadband operators that they face strong competition. In this fictional scenario substantive regulation of broadband would arguably be unnecessary because "market forces" would guide their behavior, and ensure that they do not act anti-competitively or in ways that encourage customers to transfer their subscriptions to competitors, which, but only in a truly competitive market, they can readily do if their interests are not being respected

[29] http://www.engadget.com/2015/05/26/comcast-says-charter-time-warner-deal-makes-all-the-sense-in-th/

COMPETITION IN THE US BROADBAND MARKET AT HIGHER SPEEDS



Source: Altice presentation "Altice enters US Market with acquisition of Suddenlink," page 7, http://altice.net/wp-content/uploads/2015/05/2015-05-20-Suddenlink-IR-presentation-FV.pdf

2.5.3 Frontier and the franchises divested by Verizon

Frontier Communications is becoming a much larger telephone and broadband company as a result of its acquisition of wireline assets from Verizon. Its latest (February 2015) deal with Verizon covering 3.7 million voice customers, 1.2 million video customers and 2.2 million broadband connections will double its current size.

Frontier also acquired AT&T's wireline assets in Connecticut in 2014 (the former Sothern New England Telephone) for $2 billion in cash

The latest Frontier/Verizon deal differs significantly from its earlier deal in 2009. More than half of the lines to be acquired (54%) are FTTH-based FiOS lines[30], whereas the percentage of FiOS lines in its 2009 deal was much smaller. Combining those lines with FiOS lines that Frontier previously purchased from Verizon, the U-verse lines acquired from AT&T in 2014 and the homes to which Frontier has deployed FTTH (fiber-to-the-home) will give Frontier a customer base that is 31% FiOS, FTTH, or U-verse-enabled. Previously the FiOS proportion was 14%.

Frontier's acquisitions including the latest one covering California, Texas and Florida represent a huge bet by this company on its ability to expand the coverage and capacity of its broadband offerings on a commercially successful basis in areas to which Verizon had given low priority and was unwilling to invest so as to extend its FiOS coverage. Recently (September 2015) Frontier has been making optimistic statements about its prospects for achieving this expansion.[31] At the same time, Frontier is taking advantage of funds available to it ($283 million annually to provide broadband to some 650,00 broadband locations[32]) under the Connect America Fund (phase two or CAF-II) to build out broadband service to rural locations that could not otherwise be reached economically. One of the other benefits that Frontier will gain when it completes the latest Verizon deal is an additional $50 million of funding from the second phase of the FCC's Connect America Fund (CAF-II) in California and Texas.

While Verizon turned down $144 million of CAF-II funding for the rest of its territory, it did accept CAF-II money for these two markets on the condition of regulatory approval of its deal with Frontier. Verizon's decision not to accept CAF-II funding for the territories it is retaining distinguishes it from other telephone

[30] http://files.shareholder.com/downloads/AMDA-OJWDG/3945157021x0x807528/D05E3F23-F896-4B56-AB6C-3D69DB74DBFB/Frontier_Communications_to_Acquire_Verizon_Wireline_Operations_in_California_Florida_and_Texas.pdf

[31] http://www.fiercetelecom.com/story/frontiers-jureller-we-can-improve-verizons-broadband-service-without-large/2015-09-16

[32] http://wvmetronews.com/2015/06/22/more-frontier-customers-could-see-broadband-internet-after-fcc-offer/

companies that have accepted CAF-II funding, including AT&T, which is taking annual funding of $427 million[33].

Frontier is an example of an aggressive growth play in fixed broadband that shows no signs of being deterred by Title II. The disbursement of CAF-II funds and their acceptance by significant telephone companies including the largest one, AT&T, demonstrates the commitment of the FCC to do whatever is in its power, and to help operators to extend the coverage of broadband to as many locations in the US as possible. A plausible hypothesis is that these telephone companies would not have accepted CAF-II funding if they believed that they could not operate a viable broadband business under provisions of Title II[34] serving the additional locations they will reach as a result.

2.5.4 Wireless Network Investments other than Verizon and AT&T

The two other (than Verizon and AT&T) mobile operators with quasi-national coverage (although lower than their two larger competitors), namely T-Mobile and Sprint, have been increasing their investments in wireless networks in recent years and are still doing so (Table A2, Appendix A) as they strive to catch up in terms of LTE coverage and capacity. Sprint's future investments are dependent on the willingness and appetite of its new owner (Softbank of Japan) to commit resources to the US when Sprint is still suffering from the problems it encountered (and arguably exacerbated further by its own actions) from a series of strategic mistakes including its acquisition of Nextel (since shut down) and its bet on WiMAX as an alternative technology path for mobile technology to LTE.

Sprint has lower operating margins than its competitors and is trying to reduce its expenses substantially[35]. If these efforts are not sufficiently effective, then it may be obliged to slow down or reduce its investments. It has already announced that it will not participate, i.e. spend money, in the upcoming Incentive Auctions[36], even though it supported arguments that operators other than AT&T and Verizon which currently dominate sub-1GHz spectrum holdings must have some 600 MHz reserve

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[33] http://www.fiercetelecom.com/story/att-takes-427m-caf-ii-funding-sets-plan-bring-wireline-wireless-broadband-1/2015-08-27

[34] In announcing its decision to accept CAF-II funding - see preceding footnote- AT&T said it "carefully analyzed a number of factors including the regulatory obligations associated with accepting the funds and whether the funding makes deployment economically feasible (including by using our advanced fixed wireless technology)."

[35] http://www.rcrwireless.com/20151026/workforce/jobs/sprint-cut-severance-ahead-of-lay-offs-tag17

[36] http://newsroom.sprint.com/news-releases/sprint-statement-on-the-incentive-auction.htm

spectrum set aside for them because of the uniquely valuable characteristics of low band spectrum, especially for enabling the most economic coverage of rural areas[37]. Now, and plausibly as a face saving but not credible excuse, Sprint says it already has enough spectrum[38] for its purposes. Should its financial situation oblige Sprint to reduce its investments in future will Dr. Singer also lay this decrease at the foot of Title II and not its obvious cause?

T-Mobile has been pursuing its highly publicized "uncarrier" strategy to build a stronger position in the US market since it escaped the clutches of AT&T in 2011 after it became clear that the latter's proposed acquisition of T-Mobile would be rejected by the FCC on grounds of its anti-competitive effects (i.e. reducing the number of operators with quasi-national coverage from four to three). AT&T argued at that time that T-Mobile did not have a viable future as an independent operator, a claim that was rebutted while the transaction was pending [39] and has been proved false by subsequent events.

The evidence from both Sprint and T-Mobile is that their respective company-specific factors as well as broader market and technology forces that are independent of Title II are driving their investments. They have given no indication that they are concerned about the impact of Title II, indeed Sprint affirmed before the FCC's vote on the Open Internet Order that it saw no reason why a reasonable application of Title II should affect investments in wireless networks.[40]

3. Conclusions

The strident claims of substantial reductions in broadband investment attributed to the impact of Title II by the major broadband operators and economists they fund to produce "findings" in support of this causal connection are unfounded and deceptive. They are derived from analyses that are demonstrably flawed logically and methodologically, and make use of highly selective data that distort reality, rewrite the past, and paint a highly biased picture of the current and future

[37] http://www.rethink-wireless.com/2015/03/30/us-carriers-remain-fixated-sub-1ghz.htm

[38] Sprint dies actually hold the largest amount of spectrum overall of any operator, but its licenses are dominated by high band, notably 2.5GHz frequencies which are well suited for capacity but not for coverage.

[39] Martyn Roetter, Alan Pearce, and Barry Goodstadt, "T-Mobile USA: A Better Future Without AT&T," BNA Daily Report for Executives, October 6, 2011

[40] http://www.fiercewireless.com/story/sprints-bye-carriers-will-still-invest-networks-even-under-title-ii-regulat/2015-02-11

environment – the multiple drivers and inhibitors - for broadband investment in the US. They ignore key influences on the propensity of and resources available to operators as well as their motivations to invest in broadband infrastructure. Several of these factors lie within the control of the operators themselves (e.g. their choices of how to allocate funds to investment, dividends, share buybacks (and substantial fees to lawyers, lobbyists, and external experts)) while others are the result of exogenous forces to which the operators are reacting, many of which are independent of any telecommunications-specific regulation, and in particular have absolutely nothing to do with Title II.

The claim that the level of broadband investment in the US in the first half of 2015 is evidence of Title II's negative effects upon these investments, given that the FCC's Open Internet Order was voted on and agreed to at the end of February 2015, is unbelievable. This conclusion can only be entertained by someone who for whatever reason is paying no heed to the multiple interacting factors that affect decisions about multi-year investment programs and their timing, leads and lags, and is ignoring ample evidence of the impact of factors other than Title II that is available from fluctuations in the investments by major operators over the years preceding this regulatory step.

Most seriously the observable actions and many statements of the operators themselves over the years prior to and since the promulgation of the Open Internet Order, as well as their announced plans for the future confirm that they are not behaving as if they believe that Title II is creating or will impose a significantly adverse burden or exert an influence on the broadband sector that will depress investments below what is desirable or they will decide to make on the basis of reasons other than Title II.

A more plausible hypothesis or explanation for the large broadband operators' expressions of concern and allegations of the adverse effects of Title II is that they are a scaremongering tactic designed to convince key legislative and other policy making influences that the best future is one in which there will be no effective regulatory curbs on, or authority capable of restraining their freedom to act as they please. This outcome, euphemistically expressed as a regime of "light" regulation, is typically justified on the grounds that "market forces" are sufficient to ensure that these operators will behave in the best interests of all constituencies, and will be punished for anti-competitive acts and/or behavior that is harmful to or disliked by customers who can readily find and switch to alternative broadband providers. However, the weakness of "market forces" is an inescapable fact of life in the broadband market. These operators depend on privileged access to scarce public resources through the franchises they have been awarded that substantially protect them from competition, and impose public interest obligations in exchange for these benefits.

It is the responsibility of the regulator to monitor and enforce these obligations according to the provisions of the Communications Act, a number of which are specified in Title II.

Appendix A: History and Forecasts of the Capital Investments of Broadband Operators, Current $ Billions

TABLE A1: REPORTED CAPITAL EXPENDITURES OF THE LARGEST US OPERATORS

OPERATOR	**AT&T TOTAL**	***AT&T Wireless***	***AT&T Wireline***	**VERIZON TOTAL**	***Verizon Wireless***	***Verizon Wireline***	**Comcast***
2015 (H1)	8.72	3.99	4.73	7.76	5.55	2.21	3.08
2014	21.2	11.2	10.0	16.3	10.5	5.75	6.15
2013	20.9	10.9	10.1	15.7	9.43	6.23	5.40
2012	19.5	10.7	8.8	15.2	8.86	6.34	4.92
2011	20.1	9.6	10.5	15.4	8.97	6.40	4.81
2010	19.5	8.4	11.1	15.7	8.44	7.27	4.85
2009	17.3	6.19	11.1	16.0	7.15	8.89	5.04
2008	19.7	6.03	13.7	16.3	6.51	9.80	5.55
2007	17.7	4.07	13.6	17.5	6.50	11.0	5.99

** Capital expenditures in Cable Communications Segment*
Sources: Company reports and MFRConsulting analysis and estimates

Table A2: RECENT CAPITAL EXPENDITURES OF US BROADBAND OPERATORS

Capital Expenditures ($ thousands)	1Q 2014	2Q 2014	1Q 2015	2Q 2015	1H 2014	1H 2015	Change	% Change 1H to 1H	% Change 2Q to 2Q
Comcast (cable)	$1,135,000	$1,480,000	$1,428,000	$1,652,000	$2,615,000	$3,080,000	$465,000	18%	12%
Time Warner Cable	$834,000	$1,240,000	$1,134,000	$1,263,000	$2,074,000	$2,397,000	$323,000	16%	2%
Charter	$539,000	$570,000	$351,000	$432,000	$1,109,000	$783,000	-$326,000	-29%	-24%
Cablevision	$172,195	$233,352	$157,303	$209,059	$405,547	$366,362	-$39,185	-10%	-10%
Suddenlink	$95,443	$103,189	$134,943	$113,489	$198,632	$248,432	$49,800	25%	10%
Mediacom	$24,626	$32,027	$28,580	$36,030	$56,653	$64,610	$7,957	14%	12%
Wide Open West	$52,900	$66,000	$55,600	$54,700	$118,900	$110,300	-$8,600	-7%	-17%
Cable ONE	$44,220	$34,274	$32,824	$26,477	$78,494	$59,301	-$19,193	-24%	-23%
TOTAL TOP CABLE	$2,897,384	$3,758,842	$3,322,250	$3,786,755	$6,656,226	$7,109,005	$452,779	7%	1%
Verizon (wireline)	$1,385,000	$1,345,000	$1,077,000	$1,134,000	$2,730,000	$2,211,000	-$519,000	-19%	-16%
AT&T (wireline)	$2,712,370	$2,638,240	$2,144,340	$2,582,800	$5,350,610	$4,727,140	-$623,470	-12%	-2%
CenturyLink	$670,000	$731,000	$616,000	$656,000	$1,401,000	$1,272,000	-$129,000	-9%	-10%
Frontier	$145,407	$156,763	$180,000	$206,000	$302,170	$386,000	$83,830	28%	31%
Windstream	$153,000	$205,000	$189,300	$255,000	$358,000	$444,300	$86,300	24%	24%
Fairpoint	$28,077	$34,901	$26,430	$28,298	$62,978	$54,728	-$8,250	-13%	-19%
Cincinatti Bell	$34,300	$41,200	$57,900	$74,600	$75,500	$132,500	$57,000	75%	81%
TOTAL TOP ILEC	$5,128,154	$5,152,104	$4,290,970	$4,936,698	$10,280,258	$9,227,668	-$1,052,590	-10%	-4%
Verizon (wireless)	$2,554,000	$2,771,000	$2,419,000	$3,126,000	$5,325,000	$5,545,000	$220,000	4%	13%
AT&T (wireless)	$3,082,000	$3,480,000	$1,859,000	$2,133,000	$6,562,000	$3,992,000	-$2,570,000	-39%	-39%
Sprint	$1,488,000	$1,246,000	$2,047,000	$2,346,000	$2,734,000	$4,393,000	$1,659,000	61%	88%
T-Mobile	$947,000	$940,000	$982,000	$1,191,000	$1,887,000	$2,173,000	$286,000	15%	27%
US Cellular	$109,498	$152,899	$116,079	$143,156	$262,397	$259,235	-$3,162	-1%	-6%
TOTAL TOP WIRELESS	$8,180,498	$8,589,899	$7,423,079	$8,939,156	$16,770,397	$16,362,235	-$408,162	-2%	4%
TOTAL TOP WIRED ISP	$8,025,538	$8,910,946	$7,613,220	$8,723,453	$16,936,484	$16,336,673	-$599,811	-4%	-2%
TOTAL TOP ISP	$16,206,036	**$17,500,845**	$15,036,299	**$17,662,609**	$33,706,881	$32,698,908	-$1,007,973	-3%	1%

Source: Free Press from company reports

TABLE A3: US CABLE CAPITAL SPENDING, 2009-2019

Estimated and projected U.S. cable capital spending breakouts, 2009-2019

		2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
CPE	($B)	6.7	6.2	5.5	5.8	5.9	7.2	7.0	6.4	5.7	5.1	5.0
% of total	(%)	51	48	43	42	41	44	42	38	35	33	32
Scalable Infrastructure	($B)	2.6	2.5	2.7	2.8	2.9	3.5	3.7	3.8	3.8	3.9	3.9
% of total	(%)	20	19	21	21	20	21	22	23	24	25	25
Line Extensions*	($B)	0.6	0.8	0.8	0.7	0.7	1.2	1.3	1.3	1.4	1.4	1.4
% of total	(%)	5	6	6	5	5	7	8	8	8	9	9
Upgrade/Rebuild	($B)	0.8	0.7	0.6	0.7	0.7	0.6	0.7	1.1	1.3	1.1	0.9
% of total	(%)	6	6	5	5	5	4	4	6	8	7	6
Support	($B)	2.0	2.0	2.2	2.1	2.2	2.6	2.6	2.7	2.7	2.7	2.7
% of total	(%)	15	15	17	15	15	16	16	16	17	18	18
Commercial	($B)	0.6	0.7	1.2	1.6	2.0	1.3	1.3	1.4	1.4	1.4	1.5
% of total	(%)	4	6	9	12	14	8	8	8	9	9	10
Total	**($B)**	**13.3**	**12.9**	**12.9**	**13.6**	**14.3**	**16.3**	**16.7**	**16.6**	**16.2**	**15.6**	**15.3**

As of October 2015.
*2011 through 2013 total for line extensions include Time Warner Cable plant spending for commercial subscribers.
2014 commercial allocation does not include TWC commercial spending due to change in reporting policy.

Source: SNL Kagan (CPE: Customer Premises Equipment, such as set top boxes, modems and routers)
In 2015 U.S. cable operators will have invested more than ever before in a single year (not adjusted for inflation)

Appendix B: The curious comments of Dr. Hal Singer

In his response to comments on his Forbes article on Title II and broadband investment based on data comparing the first half of 2015 with the preceding year[41], Dr. Singer wrote (selected extracts):

"Now onto the merits. You promise to bring "in-depth empirical analysis" and "longitudinal data collection and analysis" to the debate. Yet your empiricism ultimately boils down to your interpretation of what two Chief Financial Officers (CFOs) had to say about regulatory impacts during earnings reports. This is the opposite of empiricism. If you want to know how much I credit such statements when it comes to modeling economic impact, see

[41] Singer, ibid.

https://haljsinger.wordpress.com/2014/12/19/what-to-make-of-a-cfos-musings-on-regulatory-hypotheticals/. In a nutshell, asking a CFO about how a change in regulatory classification might affect investments is like asking a football player how a change in the TV blackout rule might affect stadium ticket prices. Although they both are "experts" in their respective fields, they lack the tools needed to assess a complicated economic problem. CFOs crunch historical returns in Excel all day; they are not scouring the economics literature on the impact of unbundling (or in this case, the threat of unbundling) on investments. Of course, you could find a CFO with some background in economics, but even then, mapping changes in policy into investment impacts is outside of their portfolio. Name me a CFO that has been invited to speak on a net neutrality policy panel.

And while we're engaged in "in-depth empirical analysis," why not mention the statements by AT&T's CEO Randall Stephenson about the likely impact of reclassification? In November of 2014, when President Obama announced his preference for Title II, Stephenson announced a "pause" in his company's fiber investment. This is about a close as you can get to cause and effect. In May 2015, Stephenson further explained the pause: "The exact comment I made was we're going to put a pause on our new broadband deployment plans until we see how these rules came out. We have seen how the rules came out. As we read those rules, we do believe they're subject to modification by the courts and remand by the courts to the FCC." In other words, AT&T was hedging its bets on U.S. investment during the first half of 2015; on a going-forward basis, AT&T will have discount the threat of unbundling by the (strong) likelihood that the regulatory regime will be vacated by the courts. One wonders whether some of the $3 billion investment AT&T announced for Mexico would have found its way into the United States in a world absent Title II?"

First, Dr. Singer's dismissal of the comments of CFOs on regulation and investment is disparaging and unjustified. CFOs are typically very much involved in discussions about the finances of a company and its financing needs and concerns - what a surprise, that's their job! CFOs should have a good idea of what the issues are, including the influence of regulation on the demands for and attractiveness of allocating funds to investment, in comparison to and in competition with other allocations such as to pay dividends and buy back shares.
Perhaps Dr. Singer is assuming (incorrectly) that CFOs do not talk and contribute and listen to and understand what other decision makers in operators are saying and doing, and are not included in high level deliberations about operators' choices. A CFO does not need to "scour the economics literature" for insights, because he or she is dealing with the realities experienced by a company in order to fulfill a critical responsibility.

At least Dr. Singer correctly characterizes the issue of regulation and investment as a "complicated economic problem". This observation makes it all the more inexplicable that he chooses to offer a simpleminded or simplistic and unsupported explanation of fluctuations in investment based on the presence or absence of Title II.

Second, Dr. Singer is confusing a threat that AT&T's CEO chose to utter with a plausible and fact-based analysis of what will happen. It should be obvious that a typical tactic in advocacy against a policy or decision is to predict harm if the policy is followed and benefits if it is rejected. But such threats should not go unexamined. They must be judged for their credibility on the basis of all the factors that may influence the outcome. The threat should be challenged or the bluff, if such it is, called, instead of, as Dr. Singer is doing, being accepted without question as evidence of cause and effect. In the Singer scenario all anyone in a position of influence, such as the CEO of a huge corporation such as AT&T, has to do in opposition to a proposal is to predict harm if it is implemented, which will then be sufficient to justify its rejection.

Third, Dr. Singer's comment about AT&T's announcement of its investment in Mexico, namely that it might, absent Title II, have been earmarked for the US smacks of a desperate search for any link or correlation, however feeble between the Open Internet Order and network investment in the US. Moreover as was emphasized in the rebuttal of Hassett/Shapiro deriving causation from correlation without demonstration of a causal link is a typical abuse of statistics. Why not ascribe some effects on investment programs in the first half of 2015 to the unusually severe weather (worst in 20 years) that significant segments the US population experienced in Q1 2015? It is very plausible that this weather adversely affected retail sales and economic growth so why not the pace of or progress in network investment programs?[42]

The fact is that AT&T took a business decision to enter the Mexican market under its own steam, breaking a longstanding relationship with the incumbent quasi-monopoly America Movil, as a direct consequence of the fundamental reform of the telecommunications sector initiated there by the Government of President Nieto. This reform opened opportunities in market with strong social and economic ties to the US - the second largest in Latin America after Brazil - that were previously unavailable. This decision and the subsequent acquisition of two mobile operators in Mexico, most recently bolstered by the Mexican assets acquired by AT&T in its

[42] http://www.accuweather.com/en/weather-news/harsh-winter-us-economy-sales-slow-growth-spring-summer-hope/46407985

purchase of DirecTV approved by the FCC, was reached before the Open Internet Order was promulgated, and was manifestly the result of factors that have nothing to do with Title II. In order then to grow its market share in Mexico to achieve a sustainable position AT&T has to make significant additional investments to expand the coverage and capacity of the networks it has acquired. The idea that AT&T is diverting funds to Mexico because it finds the US market less attractive because of Title II is preposterous.